

WHAT IS CLAIMED

1. An antenna system comprising:
  - a plurality of antennas having a prescribed multidimensional spatial relationship with respect to one another;
  - 5 a plurality of carrier demodulators respectively coupled to receive downconverted signals representative of outputs of said plurality of said antennas, and being operative to output baseband, carrier-demodulated signals;
  - 10 a signal processor which is operative to process a combination of said baseband, carrier-demodulated signals to derive baseband information signals contained therein; and wherein operation of said carrier demodulators is controlled
  - 15 in accordance with said baseband information signals derived by said signal processor.
2. An antenna system according to claim 1, wherein said antennas comprise spaced apart, phased array antenna panels.
3. An antenna system according to claim 1, wherein a respective carrier demodulator is operative to regenerate a coherent carrier reference signal for demodulating a respective downconverted antenna output signal, and includes a matched filter detector that converts the resulting carrier-demodulated signal to soft

decision information signals, and wherein said signal processor operative to combine said soft decision information signals to produce a composite baseband 10 signal, and to process said composite baseband signal to derive baseband decision information signals.

4. An antenna system according to claim 3, wherein operation of carrier recovery loops of said carrier demodulators is controlled in accordance with said baseband decision information signals.

5. An antenna system according to claim 1, wherein a respective carrier demodulator is configured to weight baseband, carrier-demodulated signals in accordance with a weighting control signal representative of prescribed 5 signal-to-noise ratio information associated with a signal incident upon said plurality of antennas.

6. An antenna system according to claim 5, wherein said weighting control signal is derived in accordance with the angle of incidence of said signal upon the antenna whose downconverted output is coupled to said 5 respective carrier demodulator.

7. An antenna system according to claim 4, wherein the operation of the carrier recovery loop of said respective carrier demodulator is weighted in accordance with a weighting control signal representative of

5 prescribed signal-to-noise ratio information associated  
with a signal incident upon said plurality of antennas.

8. A signal processing system for processing  
signals derived from a plurality of generally panel-  
configured phased array antennas having a prescribed  
multidimensional spatial relationship with respect to one  
5 another comprising:

a plurality of carrier demodulators respectively  
coupled to process signals representative of signal  
outputs of said plurality of said antennas, so as to  
output baseband, carrier-demodulated signals;

10 a baseband signal processor which is operative to  
process a combination of said baseband, carrier-  
demodulated signals to derive baseband information  
signals contained therein; and wherein

15 operation of carrier recovery loops of said carrier  
demodulators is controlled in accordance with said  
baseband information signals.

9. A signal processing system according to claim  
8, wherein a respective carrier demodulator is operative  
to regenerate a coherent carrier reference signal for  
demodulating a respective downconverted antenna output  
5 signal, and includes a matched filter detector that  
converts the resulting carrier-demodulated signal into  
soft decision information signals, and wherein said  
baseband signal processor operative to combine said soft

decision information signals to produce a composite  
10 baseband signal, and to process said composite baseband  
signal to derive baseband decision information signals.

10. A signal processing system according to claim  
9, wherein a respective carrier demodulator is configured  
to weight baseband, carrier-demodulated signals in  
accordance with prescribed signal-to-noise ratio  
5 information associated with a signal incident upon said  
plurality of antennas.

11. A signal processing system according to claim  
10, wherein said respective carrier demodulator is  
configured to weight baseband, carrier-demodulated  
signals in accordance with the angle of incidence of said  
5 signal upon the antenna whose downconverted output is  
coupled to said respective carrier demodulator.

12. A signal processing system according to claim  
9, wherein the operation of the carrier recovery loop of  
said respective carrier demodulator is weighted in  
accordance with a prescribed signal-to-noise ratio  
5 information associated with a signal incident upon said  
plurality of antennas.

13. A method of deriving information from a signal  
comprising the steps of:

(a) arranging a plurality of antennas capable of

receiving said signal incident thereon in accordance with  
5 a prescribed multidimensional spatial relationship;

(b) downconverting outputs of said plurality of antennas to produce a plurality of intermediate frequency (IF) signals representative of said signal incident upon said plurality of antennas;

10 (c) performing carrier demodulation of said IF signals to derive baseband, carrier-demodulated signals;

(d) processing a combination of said baseband, carrier-demodulated signals to derive baseband information signals contained therein; and

15 (e) controlling carrier demodulation of step (c) in accordance with said baseband information signals derived in step (d).

14. A method according to claim 13, wherein said antennas comprise spaced apart, phased array antenna panels.

15. A method according to claim 13, wherein step (c) comprises regenerating a coherent carrier reference signal for demodulating a respective downconverted antenna output signal through a carrier recovery loop, 5 and processing a carrier-demodulated signal by means of a matched filter to obtain a soft decision information signal, and wherein step (d) comprises combining soft decision information signals associated with respective ones of said plurality of antennas to produce a composite

10 baseband signal, and processing said composite baseband signal to derive baseband decision information signals.

16. A method according to claim 15, wherein step (e) comprises controlling operation of carrier recovery loops in accordance with said baseband decision information signals.

17. A method according to claim 13, wherein step (c) further includes weighting said baseband, carrier-demodulated signals in accordance with prescribed signal-to-noise ratio information associated with a signal 5 incident upon said plurality of antennas.

18. A method system according to claim 17, wherein said prescribed signal-to-noise ratio information is derived in accordance with the angle of incidence of said signal upon a selected antenna.

19. A method according to claim 16, wherein step (c) comprises controlling the operation of the carrier recovery loop of said respective carrier demodulator in accordance with prescribed signal-to-noise ratio 5 information associated with a signal incident upon said plurality of antennas.